CLAIMS

What is claimed is:

1.   In a plasma processing system, a method of creating a simplified equivalent circuit
model of a plasma processing system, including an electrical measuring device, a lower
electrode, an upper electrode, and a signal generator device comprising:

        creating a simplified equivalent circuit equation, including a set of variables, of said
plasma processing system, wherein said electrical measuring device comprises a first subset of
variables, said lower electrode comprises a second subset of variables, said upper electrode
comprises a third subset of variables, and said signal generator device comprises a forth subset
of variables;

        generating a first set of signals, each of said first set of signals being generated at a
different frequency, wherein said signal generator device is coupled to said electrical
measuring device, said lower electrode, and said upper electrode;

        measuring said first set of signals with said electrical measuring device, wherein at least
one measured signal is generated for each of said set of variables;

        creating a simplified equivalent circuit model from said first set of signals.

2.   The method of claim 1, wherein said set of variables includes a set of substantially
variant parameters and a set of substantially non-variant parameters.

3.   The method of claim 2, wherein each of said non-variant parameters is replaced with a
value.

4.   The method of claim 3, wherein a second set of signals is generated, each of said
second set of signals being generated at a set of fundamental frequencies, wherein said RF
source generator is coupled to said electrical measuring device, said lower electrode, and said
upper electrode.

5.   The method of claim 4, wherein said second set of signals is measured with said
electrical measuring device, wherein at least one measured signal is generated for each of said
set of the fundamental frequencies.

6.   The method of claim 5, wherein each of said set of variant parameters is calculated.

7.   The method of claim 6, wherein each of said first set of signals comprise sinusoidal signal.

8.   The method of claim 6, wherein each of said second set of signals comprise sinusoidal signal.

9.   The method of claim 6, wherein each of said first set of signals is a harmonic signal.

10.   The method of claim 6, wherein each of said second set of signals is a harmonic signal.

11.   The method of claim 6, wherein said plasma process is a etch process utilizing an etchant.

12.   The method of claim 6, wherein said set of variables includes a variable that models a resistor.

13.   The method of claim 6, wherein said set of variables includes a variable that models an inductor.

14.   The method of claim 6, wherein said set of variables includes a variable that models a capacitor.

15.   The method of claim 6, wherein said electrical measuring device is a V/I probe.

16.   The method of claim 6, wherein said electrical measuring device is a network analyzer.

17.   The method of claim 6, wherein said electrical measuring device is incorporated into the plasma processing system.

18.   The method of claim 6, wherein said signal generator device generates a fundamental frequency of about 2 MHz.

19.   The method of claim 6, wherein said signal generator device generates a fundamental frequency of about 27 MHz.

20.   In a plasma processing system, an array for creating a simplified equivalent circuit model of a plasma processing system, including an electrical measuring device, a lower electrode, an upper electrode, and a signal generator device comprising:

a first array element for creating a simplified equivalent circuit equation, including a set of variables, of said plasma processing system, wherein said electrical measuring device comprises a first subset of variables, said lower electrode comprises a second subset of variables, said upper electrode comprises a third subset of variables, and said signal generator device comprises a forth subset of variables;

a second array element for generating a first set of signals, each of said first set of signals being generated at a different frequency, wherein said signal generator device is coupled to said electrical measuring device, said lower electrode, and said upper electrode;

a third array element for measuring said first set of signals with said electrical measuring device, wherein at least one measured signal is generated for each of said set of variables;

a forth array element for creating a simplified equivalent circuit model from said first set of signals;

a fifth array element for ascertaining from said simplified equivalent circuit model a state of a component of said plasma processing system, wherein said state is one of an acceptable state and an unacceptable state.

21.   The array of claim 20, wherein said set of variables includes a set of substantially variant parameters and a set of substantially non-variant parameters.

22.   The array of claim 21, wherein each of said non-variant parameters is replaced with a value.

23.   The array of claim 22, wherein a second set of signals is generated, each of said second set of signals being generated at a set of fundamental frequencies, wherein said RF source generator is coupled to said electrical measuring device, said lower electrode, and said upper electrode.

24.   The array of claim 23, wherein said second set of signals is measured with said electrical measuring device, wherein at least one measured signal is generated for each of said set of the fundamental frequencies.

25.   The array of claim 24, wherein each of said set of variant parameters is calculated.

26.   The array of claim 24, wherein each of said first set of signals comprise sinusoidal signal.

27.   The array of claim 24, wherein each of said second set of signals comprise sinusoidal signal.

28.   The array of claim 24, wherein each of said first set of signals is a harmonic signal.

29.   The array of claim 24, wherein each of said second set of signals is a harmonic signal.

30.   The array of claim 24, wherein said plasma process is a etch process utilizing an etchant.

31.   The array of claim 24, wherein said set of variables includes a variable that models a resistor.

32.   The array of claim 24, wherein said set of variables includes a variable that models an inductor.

33.   The array of claim 24, wherein said set of variables includes a variable that models a capacitor.

34.   The array of claim 24, wherein said electrical measuring device is a V/I probe.

35.   The array of claim 24, wherein said electrical measuring device is a network analyzer.

36.   The array of claim 24, wherein said electrical measuring device is incorporated into the plasma processing system.

LMRX-P034/P1233   17

37.   The array of claim 24, wherein said signal generator device generates a fundamental frequency of about 2 MHz.

38.   The array of claim 24, wherein said signal generator device generates a fundamental frequency of about 27 MHz.